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# UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

**APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

- Fee Transmittal Form (e.g., PTO/SB/17)  
*(Submit an original and a duplicate for fee processing)*
- Applicant claims small entity status.  
See 37 CFR 1.27.
- Specification [Total Pages ]  
*(preferred arrangement set forth below)*
  - Descriptive title of the invention
  - Cross Reference to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to sequence listing, a table, or a computer program listing appendix
  - Background of the Invention
  - Brief Summary of the Invention
  - Brief Description of the Drawings *(if filed)*
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
- Drawing(s) (35 U.S.C. 113) [ Total Sheets  ]
- Oath or Declaration [ Total Pages  ]
  - a.  Newly executed (original or copy)
  - b.  Copy from a prior application (37 CFR 1.63 (d))  
*(for continuation/divisional with Box 17 completed)*
    - i.  **DELETION OF INVENTOR(S)**  
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
- Application Data Sheet. See 37 CFR 1.76

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:

 Continuation     Divisional     Continuation-in-part (CIP)

of prior application No. \_\_\_\_\_ / \_\_\_\_\_

Prior application information:

Examiner \_\_\_\_\_

Group / Art Unit: \_\_\_\_\_

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.**18. CORRESPONDENCE ADDRESS**

<input type="checkbox"/> Customer Number or Bar Code Label	(Insert Customer No. or Attach bar code label here)			or	<input checked="" type="checkbox"/> Correspondence address below
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Name (Print/Type)	Kathleen K Bowen		Registration No. (Attorney/Agent)		42,352
Signature	<i>Kathleen K Bowen</i>		Date		10/13/2000

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# FEE TRANSMITTAL for FY 2001

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT

(\$)786.00

## Complete if Known

Application Number	<u>10/13/2000</u>
Filing Date	<u>Palmer</u>
First Named Inventor	
Examiner Name	
Group Art Unit	
Attorney Docket No.	<u>20000007</u>

## METHOD OF PAYMENT

1.  The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number

501381

Deposit Account Name

Heidelberg Digital LLC.

Charge Any Additional Fee Required  
Under 37 CFR 1.16 and 1.17

Applicant claims small entity status.  
See 37 CFR 1.27

2.  Payment Enclosed:

Check  Credit card  Money Order  Other

## FEE CALCULATION

## 1. BASIC FILING FEE

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description	Fee Paid
101	710	201 Utility filing fee	<u>710</u>
106	320	206 Design filing fee	
107	490	207 Plant filing fee	
108	710	208 Reissue filing fee	
114	150	214 Provisional filing fee	

SUBTOTAL (1) (\$)710.00

## 2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
22	-20** =	<u>2</u> X <u>18</u> =	<u>36</u>
Independent Claims	<u>3</u> - 3** =	<u>—</u> X <u>—</u> =	<u>0</u>
Multiple Dependent			<u>0</u>

Large Entity Small Entity

Fee Code (\$)	Fee Code (\$)	Fee Description
103	18	203 9 Claims in excess of 20
102	80	202 40 Independent claims in excess of 3
104	270	204 135 Multiple dependent claim, if not paid
109	80	209 40 ** Reissue independent claims over original patent
110	18	210 9 ** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$)36.00

\*or number previously paid, if greater; For Reissues, see above

## FEE CALCULATION (continued)

## 3. ADDITIONAL FEES

Large Entity	Small Entity	Fee Description	Fee Paid
Fee Code (\$)	Fee Code (\$)		
105	130	205 65 Surcharge - late filing fee or oath	
127	50	227 25 Surcharge - late provisional filing fee or cover sheet	
139	130	139 130 Non-English specification	
147	2,520	147 2,520 For filing a request for ex parte reexamination	
112	920*	112 920* Requesting publication of SIR prior to Examiner action	
113	1,840*	113 1,840* Requesting publication of SIR after Examiner action	
115	110	215 55 Extension for reply within first month	
116	390	216 195 Extension for reply within second month	
117	890	217 445 Extension for reply within third month	
118	1,390	218 695 Extension for reply within fourth month	
128	1,890	228 945 Extension for reply within fifth month	
119	310	219 155 Notice of Appeal	
120	310	220 155 Filing a brief in support of an appeal	
121	270	221 135 Request for oral hearing	
138	1,510	138 1,510 Petition to institute a public use proceeding	
140	110	240 55 Petition to revive - unavoidable	
141	1,240	241 620 Petition to revive - unintentional	
142	1,240	242 620 Utility issue fee (or reissue)	
143	440	243 220 Design issue fee	
144	600	244 300 Plant issue fee	
122	130	122 130 Petitions to the Commissioner	
123	50	123 50 Petitions related to provisional applications	
126	240	126 240 Submission of Information Disclosure Stmt	
581	40	581 40 Recording each patent assignment per property (times number of properties)	<u>40.00</u>
146	710	246 355 Filing a submission after final rejection (37 CFR § 1.129(a))	
149	710	249 355 For each additional invention to be examined (37 CFR § 1.129(b))	
179	710	279 355 Request for Continued Examination (RCE)	
169	900	169 900 Request for expedited examination of a design application	

Other fee (specify) \_\_\_\_\_

\* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)40.00

## SUBMITTED BY

Name (Print/Type)	Kathleen K Bowen	Registration No. (Attorney/Agent)	42,352	Telephone	330 945 6931
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Docket No.2000007

**APPLICATION FOR UNITED STATES PATENT**

**CORONA WIRE TENSIONING MECHANISM**

INVENTORS: Daniel R. Palmer

Warren G. Branch, III

Gary B. Bertram

DATE : October 13, 2000

## CORONA WIRE TENSIONING MECHANISM

### BACKGROUND

5        The present invention is in the field of electrophotographic printers and copiers. More specifically this invention relates to the corona charging device used to charge the surface of a photoconductor.

The corona charging device usually contains one or more small diameter (e.g. .003 inch diameter) corona wires. It is important that these wires be  
10      properly tensioned. Excessive tension can result in wire breakage, whereas insufficient tension can result in wire vibration and subsequent non-uniform charging of the photoconductor. Additionally, corona wires have a finite life and must be replaced in the field.

It is common practice to spring load corona wires to achieve the proper  
15      tension. One method used to do this is to crimp lugs onto the ends of the wires, secure one end of the wires, and then insert the lugs on the other end through the hook of an extension spring. Multiple wires may then be tensioned by mounting these springs on a tensioner block and rotating and securing the tensioner block at the desired tension. One drawback of this method is that it is difficult to maintain engagement between the lugs and the springs while rotating  
20      and securing the tension block. Another drawback is that because the spring and the corona wire are in direct contact in this method, the spring is at the same voltage as the wire, and there is a risk of arcing by the spring. One further problem with this method is that the force of the spring hooks can impart side  
25      loads on the lugs, which in turn can impose undue stress on the wires.

A corona wire tensioning mechanism is desired which would allow individual replacement of the corona wires, which would not impart side loads on the wires, and which would easily maintain engagement between the wire and the tensioning mechanism and yet be isolated from the spring so as to minimize the  
30      danger of arcing by the spring.

SUMMARY OF THE INVENTION

A wire tensioning mechanism for tensioning a wire having an end one and an end two in a machine, wherein the wire has a means for attachment on end two and is fixed to the machine at end one, comprises a slide block, and a spring.

5        The slide block is slidably mounted to the machine at end two of the wire, such that the slide block slides parallel to the wire. The slide block has a slot which is wider than the wire but narrower than the means for attachment, such that when the slide block is mounted on the machine, the wire end two can be slid into the slot such that pulling the slide block in the direction away from the  
10 wire forces the means for attachment against the slot, but does not allow the means for attachment to pass through. The slot is lined up with the wire such that when the wire is in tension, there are no side loads on the means for attachment.

15

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an isometric view of a wire tensioning device according to an aspect of the invention.

20 FIGURE 2 is an isometric view of a wire tensioning device according to a further aspect of the invention.

FIGURE 3 is a side view of a wire tensioning device according to an aspect of the invention.

25 FIGURE 4 is a top view of a wire tensioning device, according to an aspect of the invention.

FIGURE 5 is a top view of a continuous corona wire configuration with a wire tensioning device according to an aspect of the invention.

## DETAILED DESCRIPTION

. This invention discloses a means for spring loading the wire **6** without actually attaching the spring **40** to the wire **6**. This minimizes the risk of arcing from the spring **40** to the wire **6** and to other components within the machine. This improvement also minimizes side loads on the wire **6** by distributing the force on the attachment means **3**, such as a lug, all the way around the attachment means **3**.

Various aspects of the invention are presented in Figures 1-5 which are not drawn to scale and in which like components are numbered alike. Referring now to Figure 1 according to an aspect of the invention, a wire tensioning mechanism **2** for tensioning a wire **6** having an end one (not shown) and an end two **7** (see figures 2-3) in a machine **4** wherein the wire **6** has a means for attachment **3** on end two **7** and is fixed to the machine **4** at end one, comprises a slide block **30**, and a spring **40**.

The slide block **30** is slidably mounted to the machine **4** at end two **7** of the wire, such that the slide block **30** slides parallel to the wire **6**. The slide block **30** has a slot **35** which is wider than the wire **6** but narrower than the means for attachment **3**, such that when the slide block **30** is mounted on the machine **4**, the wire end two **7** can be slid into the slot **35** such that pulling the slide block **30** in the direction away from the wire **6** forces the means for attachment **3** against the slot **35**, but does not allow the means for attachment **3** to pass through. The slot **35** is lined up with the wire **6** such that when the wire **6** is in tension, there are no side loads on the means for attachment **3**. In a preferred embodiment, the means for attachment **3** is a lug crimped on the wire end two **7**.

In order to align the wire **6** to the desired direction, the machine **4** will often have grooves **8** where the wire must lay. In this case, the slide block **30** is preferably slightly offset from the groove **8** in order to register the wire **6** against the groove **8** such that the wire **6** doesn't move.

The spring **40** is mounted between the machine **4** and the slide block **30** such that the spring **40** exerts a force on the slide block **30** in the opposite direction of

the force which the tensioned wire **6** exerts on the slide block **30**. The force of the spring **40** can cause the slide block **30** to slide, and the spring **40** is chosen such that the force exerted on the slide block **30** causes the wire **6** to achieve the desired tension. Thus the spring **40** forces the slide block **30** to pull on the wire  
5      **6**.

Referring now to Figures 2-4, in a preferred embodiment of the invention, the wire tensioning mechanism **2** further comprises a holder **10** which is mounted to the machine **4**. In this embodiment, the slide block **30** is slidably mounted to the holder **10**. A preferred means of slidably mounting the slide block **30** to the  
10     holder **10** is to use a slide pin **20**, wherein the slide pin **20** is mounted to the holder **10**. A slide pin **20** may be mounted directly to the machine **4**, wherein the slide block **30** is slidably mounted to the machine **4** on the slide pin **20** (this configuration is not shown).

When a holder **10** is incorporated, the spring **40** may be mounted between  
15     the machine **4** and the slide block **30**, or between the holder **10** and the slide block **30** (this configuration not shown). The preferred embodiment is to have the spring **40** mounted between the slide block **30** and the holder **10**.

In a further preferred embodiment, the slide block **30** is v-shaped, and the v-shaped slide block **30** comprises a leg one **34** and a leg two **32** (this is best seen  
20     in Fig-3). Slide block leg one **34** is slidably mounted to the machine **4**, and leg two **32** is on the same side of leg one **34** as the wire **6** such that leg two **32** angles away from the wire **6**. Thus the "v" is laying on one of its sides (leg one **34**), and the slot **35** is in the other side of the "v" (leg two **32**). The portion of the slide block **30** with the slot **35** angles away from the wire **6** in order to better keep  
25     the wire **6** from slipping out of the slot **35**.

According to a further preferred embodiment, the spring **40** is a compression spring. Although a compression spring is preferred for space constraint reasons, a tension spring will also work.

In a typical electrophotographic machine, multiple corona wires are  
30     present.

Referring now to Figure 5, rather than have individual wires, according to a further aspect of the invention, a single continuous wire **6** may be used which would be strung in such a way as to create multiple segments. This continuous wire **6** would have an end one **5** and an end two **7**, wherein end one **5** is secured  
5 against movement and end two **7** has a lug **3** crimped on. Wherein the necessary bends in the wire are achieved by wrapping the wire **6** around restraining devices **50**, end two **7** is wrapped around the final restraining device **51** such that it makes an angle with the rest of the wire **6** of approximately 90°. End two **7** is then secured by a wire tensioning mechanism of the type described  
10 above. Many different types of restraining devices are acceptable; posts, pins, pulleys and grooves are all examples of restraining devices which may be used. However this invention is not limited to these specific examples, any device which acts to restrain the wire such that the wire may be bent into multiple segments may be used.

What is claimed is:

1. A wire tensioning mechanism for tensioning a wire having an end one and an end two, in a machine, wherein said wire is fixed to the machine at end one and has a means for attachment on end two, comprising:
  - 5 a slide block which is slidably mounted to the machine at the wire end two such that said slide block slides parallel to the wire, having a slot which is wider than the wire but narrower than the means for attachment such that when said slide block is mounted on the machine, the wire end two can be slid into said slot such that pulling said slide block in the direction away from the wire forces the
  - 10 means for attachment against the slot, but does not allow the means for attachment to pass through, and wherein said slot is lined up with the wire such that when the wire is in tension, there are no side loads on the means for attachment; and
    - 15 a spring which is mounted between the machine and said slide block such that said spring exerts a force on said slide block in the opposite direction of the force which the tensioned wire exerts on said slide block, such that the force of said spring can cause said slide block to slide, and wherein said spring is chosen such that the force exerted on said slide block causes the wire to achieve the desired tension.
  - 20 2. The wire tensioning mechanism of claim 1 wherein said means for attachment is a lug which has been crimped on the wire.
  3. The wire tensioning mechanism of claim 1 further comprising a slide pin which is mounted to the machine, wherein said slide block is slidably mounted to the machine on said slide pin.
  - 25 4. The wire tensioning mechanism of claim 1 further comprising a holder, wherein said holder is mounted to the machine, and said slide block is slidably mounted to said holder.
  5. The wire tensioning mechanism of claim 1 further comprising a holder wherein said holder is mounted to the machine, and said slide block is slidably mounted to said holder, and said spring is mounted between said slide block and said holder.
- 30

6. The wire tensioning mechanism of claim 1 further comprising:  
a holder, wherein said holder is mounted to the machine; and,  
a slide pin which is mounted to said holder, and wherein said slide block is  
slidably mounted to said holder on said slide pin.

5 7. The wire tensioning mechanism of claim 1 wherein said slide block is v-  
shaped, and wherein said v-shaped slide block comprises a leg one and a leg  
two wherein said slide block leg one is slidably mounted to the machine, and  
wherein said leg two is on the same side of said leg one as the wire such that  
said leg two angles away from the wire, wherein said slot is in said leg two.

10 8. The wire tensioning mechanism of claim 1 wherein said spring is a  
compression spring.

9. In a corona wire tensioning device for electrophotography, the wire having  
opposing ends end one and end two, and having a lug crimped on end one and  
end two as a means for attachment to the wires, wherein end one of the wire is  
secured against movement, and the end two of the wire is laid in a groove on the  
electrophotographic machine to align the wire to the desired position, and spring  
loaded to the appropriate tension, the improvement comprising:

15 a holder which is mounted to the machine at the position of the grooves;  
a slide pin which is mounted to said holder such that it is parallel to the wire;

20 a v-shaped slide block comprising a leg one and a leg two wherein said slide  
block leg one is slidably mounted to said holder on said slide pin such that said  
slide block leg one is free to slide on said slide pin in the direction parallel to the  
wire, and such that said leg one is parallel to said slide pin, and wherein said leg  
two is on the same side of said holder as the wire such that said leg two angles

25 away from the wire, wherein said leg two has a slot which is wider than the wire  
but narrower than the lug such that when said slide block is mounted on said  
holder, the wire end two having the lug crimped on can be slid into said slot such  
that pulling on the wire in the direction away from said slide block forces the lug  
into the back of said slot, but does not allow the lug to pass through, and wherein

30 said slot is slightly offset from the groove such that when the wire is in tension,  
the wire is registered against the groove; and,

a spring having an end one and an end two, wherein said spring is mounted between said holder and said slide block such that said spring exerts a force on said slide block in the opposite direction of the force which the tensioned wire exerts on said slide block, such that the force of said spring can cause said slide  
5 block to slide along said slide pin, and wherein said spring is chosen such that the force exerted on said slide block causes the wire to achieve the desired tension.

10. In the corona wire tensioning device for electrophotography of claim 9 wherein said spring is a compression spring.

10 11. A corona wire configuration with a tensioning mechanism for an electrophotographic machine comprising:

a single continuous wire having an end one and an end two, wherein end one is secured against movement and end two has a lug crimped on, and wherein said wire is strung in such a way as to create multiple segments;

15 restraining devices which are mounted to the machine such that the necessary bends in said wire are achieved by wrapping said wire around said restraining devices;

20 a final restraining device, such that end two is wrapped around said final restraining device such that it makes approximately a 90° angle with the rest of said wire;

25 a slide block which is slidably mounted to the machine such that said slide block slides towards said final restraining device, having a slot which is wider than the wire but narrower than the means for attachment such that when said slide block is mounted on said holder, the wire end having the means for attachment crimped on can be slid into said slot such that pulling on the wire in the direction away from the slide block forces the means for attachment into the back of the slot, but does not allow the means for attachment to pass through, and wherein said slot is lined up with the wire such that when the wire is in tension, there are no side loads on the means for attachment; and

30 a spring having an end one and an end two, wherein said spring is mounted between the machine and said slide block such that said spring exerts a force on

said slide block in the opposite direction of the force which the tensioned wire exerts on said slide block, such that the force of said spring can cause said slide block to slide, and wherein said spring is chosen such that the force exerted on said slide block causes the wire to achieve the desired tension.

5    12. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein said restraining devices are pins.

13. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein said restraining devices are

10    pulleys.

14. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein said restraining devices are posts.

15    15. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein said restraining devices are grooves.

16. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein said means for attachment is a lug which has been crimped on the wire.

20    17. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11 wherein said slide block is slidably mounted on a slide pin, which is mounted to the machine.

18. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein a holder is mounted to the

25    machine, and said slide block is slidably mounted to said holder.

19. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein a holder is mounted to the machine, and said slide block is slidably mounted to said holder, and said spring is mounted between said slide block and said holder.

30    20. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein a holder is mounted to the

machine, and said slide block is slidably mounted on a slide pin which is mounted to said holder.

21. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein said slide block is v-shaped,

5 and wherein said v-shaped slide block comprises a leg one and a leg two wherein said slide block leg one is slidably mounted to the machine such that said slide block leg one is free to slide in the direction parallel to the wire, and wherein said leg two is on the same side of said leg one as the wire such that said leg two angles away from the wire, wherein said slot is in said leg two.

10 22. The corona wire configuration with a tensioning mechanism for the electrophotographic machine of claim 11, wherein the spring is a compression spring.

15

20

## ABSTRACT

A wire tensioning mechanism for tensioning a wire having an end one and an end two in a machine in which the wire has a means for attachment 5 on end two and is fixed to the machine at end one, comprises a slide block, and a spring.

The slide block is slidably mounted to the machine at end two of the wire, such that the slide block slides parallel to the wire. The slide block has a slot which is wider than the wire but narrower than the means for attachment, such 10 that when the slide block is mounted on the machine, the wire end two can be slid into the slot such that pulling the slide block in the direction away from the wire forces the means for attachment against the slot, but does not allow the means for attachment to pass through. The slot is lined up with the wire such that when the wire is in tension, there are no side loads on the means for 15 attachment.

1/3

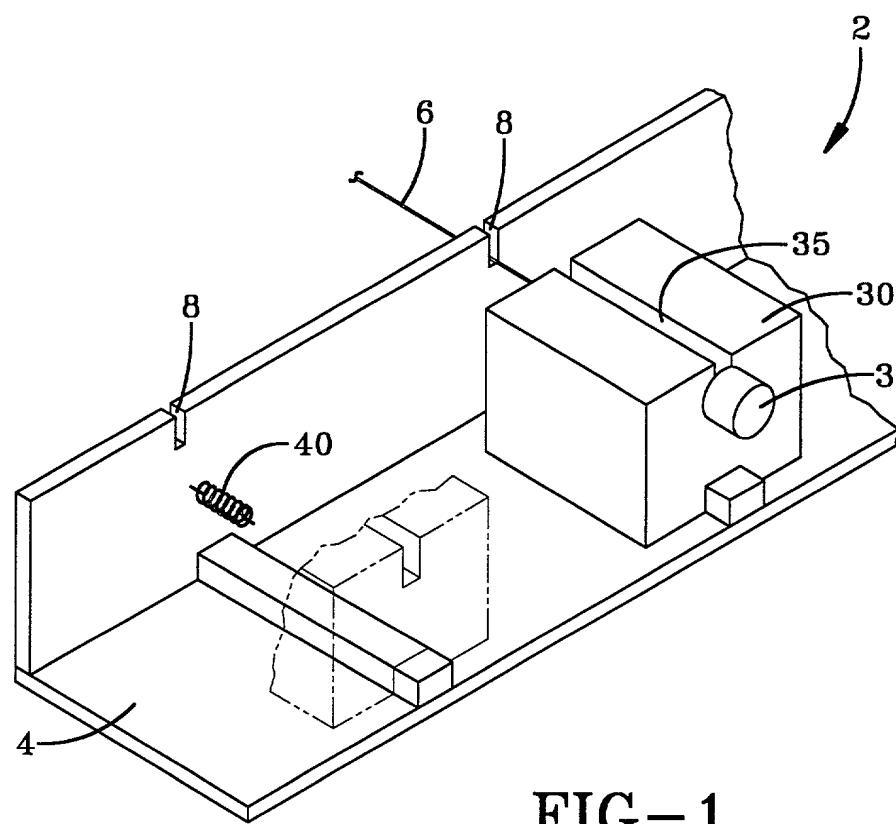


FIG-1

2/3

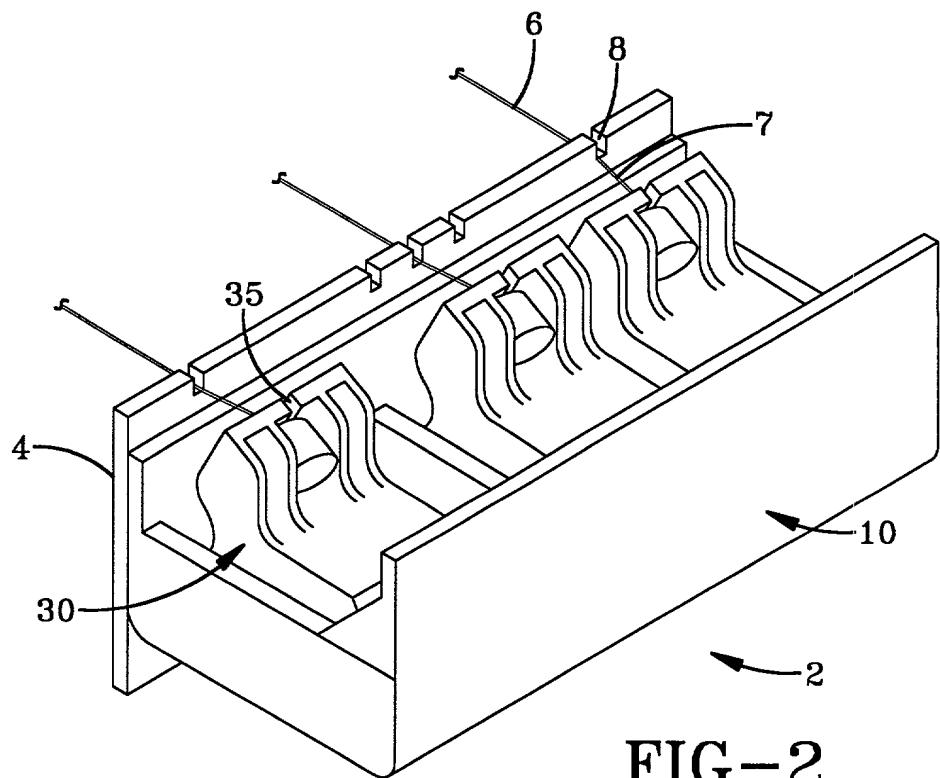


FIG-2

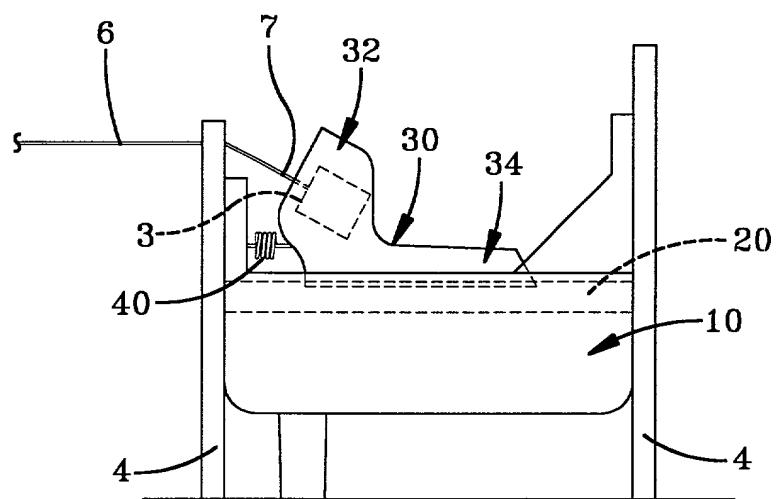
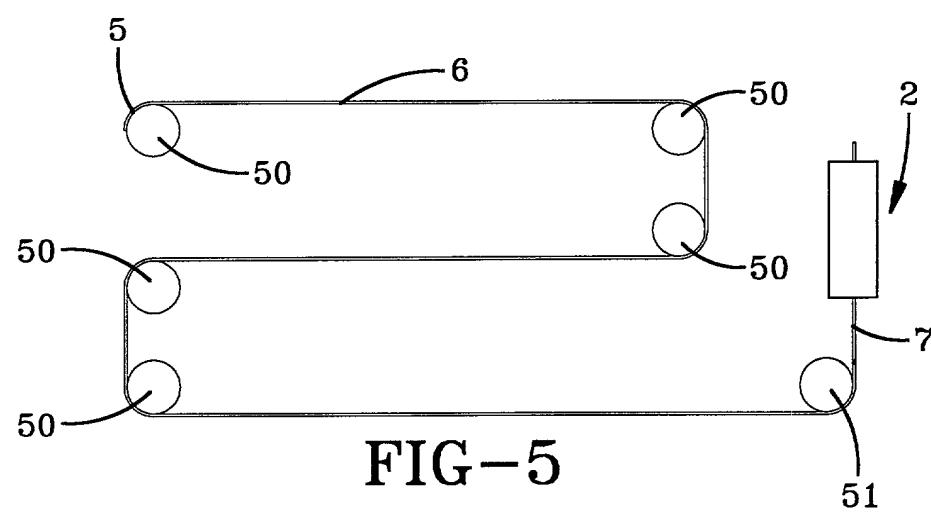
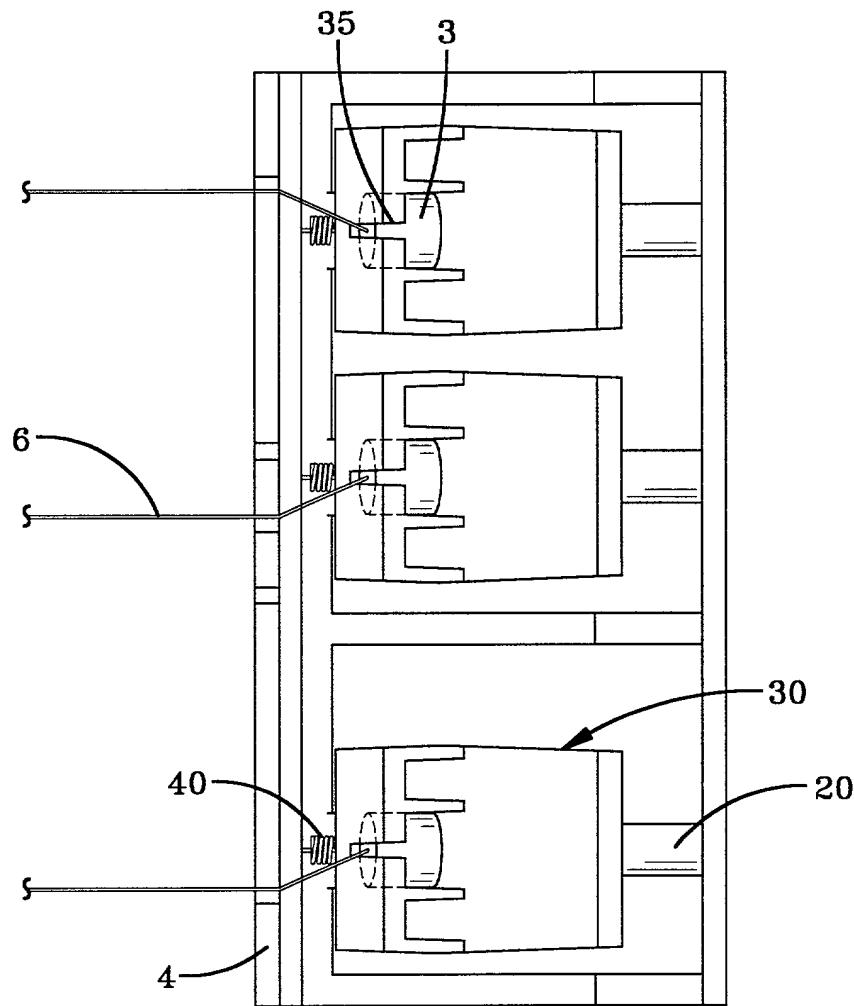


FIG-3

3/3



DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Corona Wire Tensioning Mechanism, the specification of which:

- is attached hereto.
- was filed on \_\_\_\_\_ as Application Serial No. \_\_\_\_\_.
- and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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 Full name of sole or first inventor  
 Residence  
 Citizenship  
 Post Office Address

*Daniel R. Palmer* \_\_\_\_\_ Date: OCT. 10, 2000  
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 United States  
 29 Westwind Dr

Inventor's Signature  
 Full name of second joint inventor, if any  
 Residence  
 Citizenship  
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Inventor's Signature  
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Inventor(s): Daniel R. Palmer, Gary B. Bertram, Warren G. Branch, IIITitle: Corona Wire Tensioning Mechanism**POWER OF ATTORNEY**

The specification of the above-identified patent application:

is attached hereto  
 was filed on \_\_\_\_\_ as application Serial No. \_\_\_\_\_

I hereby revoke all previously granted powers of attorney in the above-identified patent application and appoint the following attorneys to prosecute said patent application and to transact all business in the Patent and Trademark Office connected therewith:

James A. Cairns (32,557)  
 Richard A. Romanchik (33,766)  
 Kevin L. Leffel (37,379)  
 John L. Wood (32,183)

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311 Hillbrook Dr.  
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Heidelberg Digital L.L.C., a corporation, certifies that it is the assignee of the entire right, title and interest in the patent application identified above by virtue of either:

An assignment from the inventor(s) of the patent application identified above, a copy of which is attached hereto.

OR

An assignment from the inventor(s) of the patent application identified above. The assignment was recorded in the Patent and Trademark Office at Reel \_\_\_\_\_, frame \_\_\_\_\_.

OR

A chain of title from the inventor(s), of the patent application identified above, to the current assignee as shown below:

1. From \_\_\_\_\_ To:  
 The document was recorded in the Patent and Trademark Office at  
 Reel \_\_\_\_\_, frame \_\_\_\_\_, or a copy thereof is attached.

2. From \_\_\_\_\_ To:  
 The document was recorded in the Patent and Trademark Office at  
 Reel \_\_\_\_\_, frame \_\_\_\_\_, or a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet.

The undersigned has reviewed the assignment or all the documents in the chain of title of the patent application identified above and, to the best of undersigned's knowledge and belief, title is in the assignee identified above.

The undersigned (whose title is supplied below) is empowered to act on behalf of the assignee.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature

Date:

10/12/00

Name:

James A. Garde

Title:

Chief Financial Officer